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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,170	04/02/2004	Heine Melle Mulder	081468-0309024	7878

909 7590 02/20/2007
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EXAMINER

GUTIERREZ, KEVIN C

ART UNIT	PAPER NUMBER
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2851

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/816,170

Applicant(s)

MULDER ET AL.

Examiner

Kevin Gutierrez

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 16-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application*
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed November 22m 2006 have been fully considered but they are not persuasive.

Regarding the arguments on pages 6-7 and 9, the applicant states the fly-eye lens 7 is clearly not a reflective integrator. The Examiner respectfully disagrees. As known in the art, a fly-eye lens is an optical integrator with internal reflections. Thus, it is broadly interpreted as a reflective integrator. Applicant has not clearly defined the reflective integrator in the claims other than it is disposed along an optical axis of the lithographic apparatus having rectangular cross-sections perpendicular to the optical axis. The applicant's specific argument is "a reflective integrator to create a plurality of source points by reflection" is not found in the claim language. The same reasons above apply to the fly-eye lens of Mori (regarding the arguments on page 9).

Regarding the arguments on pages 7-8, the applicant states the aperture stop 8 clearly is not configured to redistribute an intensity distribution exiting the reflective integrator such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes. The Examiner respectfully disagrees. Further interpretation, the aperture stop allows certain light rays to pass through. Therefore, the resulting passing rays correspond to the redistributed intensity distribution and are the number of source images is different in the vertical and horizontal regions (col. 10, lines 19-22), which correspond to asymmetry in the X or Y axes.

Regarding the arguments of pages 9-10, the applicant states the mirror in Mori located immediately after the optical unit clearly is not configured to redistribute an intensity distribution exiting the reflective integrator such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes. The Examiner respectfully disagrees. Clearly, the beams that reflect off the mirror impinge the mask in another X and Y orientation prior to its orientation before reflection off the mirror. This is broadly interpreted as a redistribution of intensity that is asymmetric with respect to at least one of the X and Y axes.

In response to applicant's argument that the combination of Mori and Bowron clearly lacks merit, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4, 13 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishi et al. (5,991,009).

Regarding claims 1 and 13, Nishi et al. disclose “a reflective integrator (fig. 1, ref. 7; fly-eye-lens) disposed along an optical axis (AX) of the lithographic apparatus, the reflective integrator (7) having a rectangular cross-section perpendicular to said optical axis (AX), the cross-section having sides parallel to mutually perpendicular X and Y axes (col. 8, lines 3-4); and

an optical element (8; aperture stop), constructed and arranged to redistribute an intensity distribution exiting the reflective integrator (7) such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes (col. 8, lines 16-17; col. 10, lines 9-14).”

Regarding claim 4, Nishi et al. disclose “wherein said optical element (8) is disposed downstream of said reflective integrator (7) in a pupil plane of said illumination system (col. 8, lines 12-14).”

Regarding claim 16, Nishi et al. disclose the limitations set forth in claim 1 and further disclose

“an illumination system (1-12) for providing a projection beam of radiation (IL1-2);

a support structure (19; reticle stage) for supporting a patterning device (13; reticle), the patterning device serving to impart the projection beam with a pattern of its cross-section (col. 2, lines 1-4);

a substrate table (17; wafer stage) for holding a substrate (16; wafer);

a projection system (15) for projecting the patterned beam onto a target portion of the substrate (16);

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (6,337,734). In view of Bowron et al. (6,205,271).

Regarding claims 1 and 13, Mori discloses a reflective integrator (fig. 1, ref. 4; fly-eye lens) disposed along an optical axis (see fig. 1, where center horizontal middle line of light rays depict is the optical axis) of the lithographic apparatus,

“an optical element (see fig. 1, where the optical element (denoted by a diagonal solid line) located after optical element 7 in the direction away from fly eye lens 4), constructed and arranged to redistribute an intensity distribution exiting the reflective integrator (4) such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes (the beams reflected are set in a change of direction (thus, as well as redistributing intensity) towards a mask 8 and at least 2 sets the of the 3 bundles of light rays are asymmetric to the X or Y axes).”

Mori disclose an optical integrator (4) with its cross-section having sides parallel to mutually perpendicular X and Y axes (col. 1, lines 35-40), but does not disclose "a reflective integrator having a rectangular cross-section."

However, having "a reflective integrator having a rectangular cross-section" is known to the art as it is evident by the teaching of Bowron et al. (see fig. 1A and 1B). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to modify the optical integrator of Mori by having a rectangular cross-section for at least the purpose of reducing the amount of reflections.

Regarding claims 2-3, Mori discloses wherein said optical element is constructed and arranged to rotate an intensity distribution of a beam of radiation around said optical axis over an angle between 5 and 85 degrees" and "wherein said angle is $90/n$ degrees where n is an integer number in a range from 2 to 18 (see fig. 1, where beam the reflected off of the said mirror has changed in direction)."

6. Claims 2-3, 5-12 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi et al. in view of Wynne Willson et al. (6,102,554).

Regarding claim 5, Nishi et al. disclose all of the claimed limitations except for "wherein said optical element includes at least one pair of reflective surfaces, said pair of reflective surfaces constructed and arranged to reallocate part of the intensity distribution of said beam."

However, “wherein said optical element includes at least one pair of reflective surfaces, said pair of reflective surfaces constructed and arranged to reallocate part of the intensity distribution of said beam” is known to the art as it is evident by the teaching of Wynne Willson et al. (col. 4, lines 21-23; where at least a pair of blades can be made by various reflective materials and is capable of reallocating part of an intensity distribution of a beam). Thus, it would have been obvious to one ordinary skilled in the art at the time the invention was made to modify the optical element of Nishi et al. by having blades of reflective surfaces for at least the purpose of detecting the illuminance of the beam.

Regarding claim 6, Nishi et al. further disclose “wherein a distance (see fig. 1) between the optical axis (AX) and said part of the intensity distribution upstream of said optical element (8) is equal to said distance downstream of said optical element (see fig. 1, where light rays upstream and downstream from 8 are equal).”

Regarding claim 7, Wynne Willson et al. further disclose “wherein said reflective surfaces include coated mirrors (col. 4, line 22, where the blade material can be made of dichroic glass.”

Regarding claim 8, Wynne Willson et al. further disclose “wherein said at least one pair of reflective surfaces are planar and parallel to each other (see fig. 1A, col. 4, lines 41-43, where the blades 10 are parallel and planar) so that a direction of a ray of said beam of radiation upstream of said optical element equals a direction of said ray downstream of said optical element (col. 2, lines 46-51).”

Regarding claims 9 and 19, Wyne Willson et al. further disclose “wherein the optical element includes two pairs of reflective surfaces (col. 3, lines 8-10), each pair of reflective surfaces constructed and arranged to reallocate one of two respective poles of said intensity distribution (col. 4, lines 45-47).”

Regarding claims 10 and 20, Wyne Willson et al. further disclose “wherein said optical element includes a plurality of pairs of reflective surfaces constructed and arranged to rotate substantially a whole intensity distribution of said beam of radiation (col. 4, line 22; col. 5, lines 49-52, where the reflective surfaces can reflect substantially a whole intensity distribution with closed blades).”

Regarding claim 11, Wyne Willson et al. further disclose “wherein said plurality of pairs of reflective surfaces (col. 4, line 22) includes radially extending (see fig. 1A, where the blades 10 extend in the radial direction) and tilted mirror blades (col. 5, lines 47-51, where light is reflected at an angle), the mirror blades including a reflective coating at both sides (col. 4, line 22).”

Regarding claim 12, Wyne Willson et al. further disclose “wherein a thickness of said mirror blades varies as a function of distance from the optical axis and as a function of angle around the optical axis (col. 6, lines 24-26).”

Regarding claim 18, Nishi et al. in view of Wyne Willson et al. further disclose the limitations set forth in claims 4-5.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Gutierrez whose telephone number is (571)-272-5922. The examiner can normally be reached on Monday-Friday: 8:00 a.m. - 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on (571)-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2851

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin Gutierrez
Examiner
Art Unit 2851

Thursday, February 15, 2007



DIANE LEE
SUPERVISORY PATENT EXAMINER